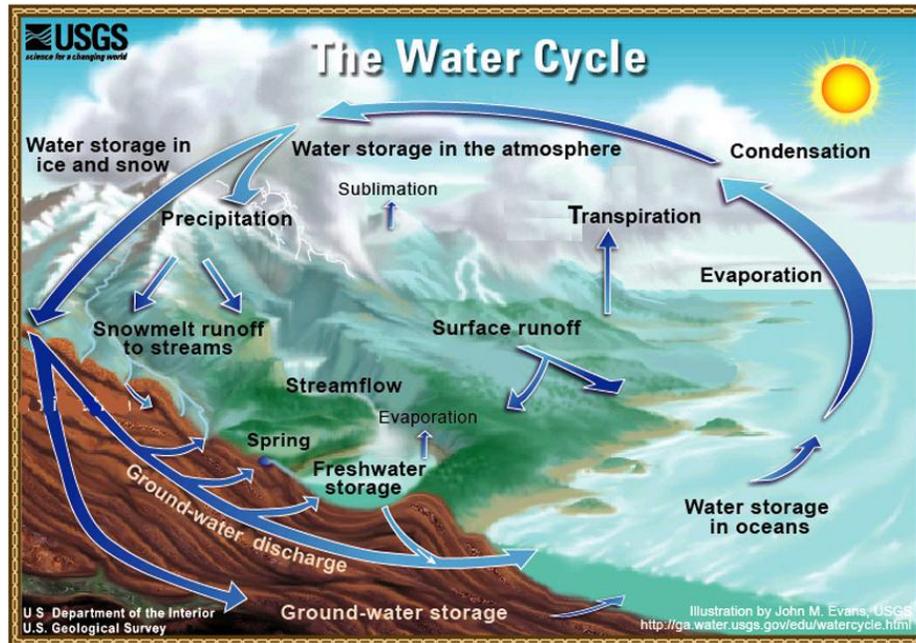


### National Science Content Standards:

A: Science as Inquiry

D: Earth Space and Science

C: Life Science



Graphic credit: USGS

**BACKGROUND:** The water portion of our planet is called the hydrosphere. But water doesn't just sit still; it is constantly in motion. The distribution (where and how much) of water has changed over time, recycling for billions of years through the hydrologic cycle, or water cycle. Water has many forms in this cycle and can collect as ice, snow, lakes, oceans, rivers, and groundwater. The movement of water is powered by the sun and the Earth's gravity. If you have ever watched water boil, you have seen molecules in motion. As water heats you see bubbles and steam rise up off the surface.

In the natural *water cycle*, solar energy heats the top layer of lakes, rivers, streams or oceans. Although the warmth of the sun doesn't boil the water, it does cause the droplets to transform into vapor that rises up back into the atmosphere through a process called *evaporation*. When it rains, plants drink water through their roots and leaves. When the sun heats up plants, they sweat out water molecules into the air which in turn become vapor that rises into the atmosphere through a process called *transpiration*. Water vapor in the atmosphere from transpiration and evaporation cools through a process called *condensation* and comes together to form tiny droplets in clouds. When the clouds cool over land and become too heavy, gravity pulls all the water out and it returns to earth in the form of rain, snow, and other kinds of



**precipitation.** Some of the precipitation soaks into the ground, and this underground water is trapped between rock or clay layers; this is called **groundwater.** Most of the water flows downhill as **runoff** where it is absorbed above ground, eventually returning to be stored in bodies of water and in plants where evaporation and transpiration will happen again, causing the cycle to repeat itself.

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## WHAT AT THE WINDOW ACTIVITY

Activity adapted from The Groundwater Foundation's "Water Cycle in a Bag" [www.groundwater.org](http://www.groundwater.org).

### OBJECTIVE:

To better understand the water cycle and how pollutants move through the system.

### MATERIALS:

- 2 sealable plastic bags (sandwich size)
- Two tablespoons of hot water
- Two tablespoons of cold water
- Food coloring
- Masking tape



### Procedure - Part I.

- 1) Make two water bags, one with the hot water, and one with the cold water.
- 2) Blow air inside each bag with your mouth and quickly seal the bag closed.
- 3) Based on what you know about how water behaves in the water cycle, compare the two bags.
  - a. What do you see happening in the bags? Is the water in the two bags reacting differently?
  - b. Which part of the demonstration simulates evaporation? Condensation? Precipitation?

### Procedure - Part II.

- 1) Using the same two bags, place two drops of food coloring in each one. The food coloring is our "pollutant" added to the water cycle.
- 2) Place one of the bags on a sunny window ledge, or tape directly to the window pane.
- 3) Place the other bag on a shaded window ledge. The water cycle starts when the droplets form on the bags.
- 4) Periodically look at the bags throughout the day.
  - a. What changes do you see in both bags?
  - b. What differences do you see in the bag in the shade vs. the bag in the sun?
  - c. What is the energy source in this demonstration?
  - d. What happens to the food coloring in the bag's "water cycle"? Does the water cycle help "purify" the water? If so, in what part?
  - e. What changes would occur in the water cycle if our climate were to warm or cool significantly?